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**Answer each question without a calculator.**

1. Evaluate  $\lim_{x \rightarrow \infty} \frac{5x + \sin x}{x} =$

2. Evaluate  $\lim_{x \rightarrow 0} \frac{5x + \sin x}{x} =$

3. Give the equations of the two vertical asymptotes closest to the origin on the graph of  $f(x) = \tan x$

4. Find a simple right end behavior model for the function  $f(x) = e^x - 2x$

5. Evaluate  $\lim_{k \rightarrow -\infty} \frac{1 - \cos x}{x^2} =$

6. Evaluate  $\lim_{y \rightarrow \infty} \left( \frac{2}{x} + 1 \right) \left( \frac{5 + x^2}{x^2} \right) =$

7. Write a power function end behavior model for the function  $f(x) = 3x^2 + 2x - 1$

8. Write a power function end behavior model for the function  $f(x) = \frac{x^5 - x^4 + x + 1}{2x^2 + x - 3}$

9. Write a power function end behavior model for the function  $f(x) = \frac{x - 2}{2x^2 + 3x - 5}$

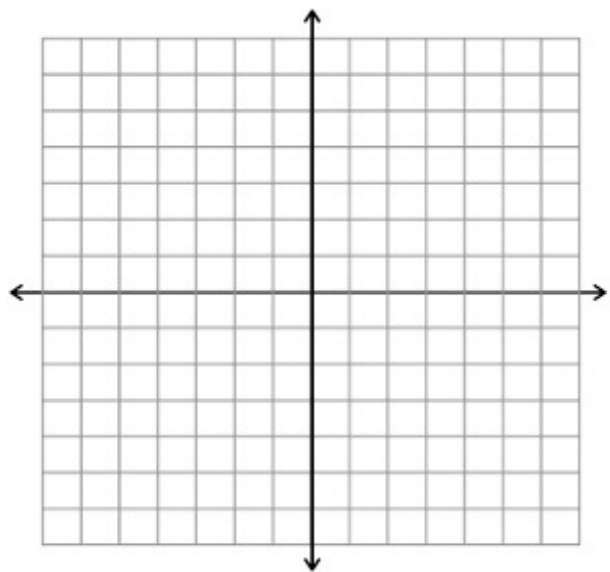
10. Evaluate  $\lim_{x \rightarrow \infty} (x^2 e^{-x}) =$

11. Evaluate  $\lim_{x \rightarrow -\infty} (x^2 e^{-x}) =$

12. Sketch a graph of a function  $y = f(x)$  that satisfies the stated conditions. Include any asymptotes.

Conditions:  $\lim_{x \rightarrow 1} f(x) = 2$ ,  $\lim_{x \rightarrow 5^-} f(x) = \infty$ ,  $\lim_{x \rightarrow 5^+} f(x) = \infty$ ,  $\lim_{x \rightarrow \infty} f(x) = -1$ ,

$\lim_{x \rightarrow -2^+} f(x) = -\infty$ ,  $\lim_{x \rightarrow -2^-} f(x) = \infty$ , &  $\lim_{x \rightarrow -\infty} f(x) = 0$



OPTIONAL EXTRA CREDIT

Evaluate  $\lim_{x \rightarrow 0} \frac{\sin(2x)}{x} =$